

RAFFLES MUSEUM GUIDE.

Mammals of Malaysia

PART I.

Malaysian Ungulates

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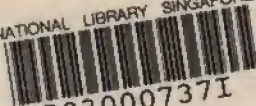
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RAFFLES MUSEUM GUIDE.

Mammals of Malaysia

PART I.

Malaysian Ungulates

BY

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CONTENTS.

	Page.
Table of Contents	iii
List of Illustrations	v
Preface	vi
Hoofed Mammals (UNGULATA)	1
Long-Nosed Ungulates (PROBOSCIDEA)	5
Elephant (<i>Elephantidae</i>)	5
Odd-Toed Ungulates (PERISSODACTYLA)	8
Tapirs (<i>Tapiridae</i>)	8
Rhinoceroses (<i>Rhinocerotidae</i>)	9
Even-Toed Ungulates (ARTIODACTYLA)	12
Pigs (<i>Suidae</i>)	12
Mouse-Deer (<i>Tragulidae</i>)	16
Deer (<i>Cervidae</i>)	18
Oxen and Goats (<i>Bovidae</i>)	22
Geographical Distribution of Malaysian Ungulates	26
Noninal List of Malaysian Ungulates	27
Literature on Malaysian Ungulates	30

ILLUSTRATIONS.

	Facing
Outline Map of Malaysia	p. v
I. Types of Ungulate Feet, exhibited in the Raffles Museum	p. 1
II. The Asiatic Elephant, shot by Mr. T. R. Hubback	p. 5
III. Young Malayan Tapir, in the Raffles Museum ..	p. 8
IV. The Sumatran Rhinoceros, shot by Mr. T. R. Hub- back	p. 11
V. Types of Pig Skulls, in the Raffles Museum ..	p. 13
VI. The Bearded Pig, from Rhio Archipelago ..	p. 15
VII. The Smaller Mouse-Deer or Plandok in the Raffles Museum	p. 17
VIII. The Barking Deer, exhibited in the Raffles Museum	p. 21
IX. The Gaur or Seladang, shot by Mr. T. R. Hubback	p. 23
X. The Water Buffalo, in British North Borneo ..	p. 25



PREFACE.

The only guide hitherto published for the Raffles Museum is a "Guide to the Zoological Collections," brought out by Dr. Hanitsch, the late Director, in 1908. As pointed out in his preface, the collections of the Raffles Museum being practically restricted to the "Malay region," his Guide might more correctly be entitled "An Introduction to the study of the Fauna of the Malay region, as illustrated by the specimens in the Raffles Museum." As such this Guide admirably fulfilled its purpose, but it is now unfortunately out of print and the stock sold out. Instead of bringing out a second edition it has been considered advisable to plan a series of small guides which will each deal in a more comprehensive manner with the numerous branches of the Natural History collections than was possible in the general Guide published by Dr. Hanitsch.

The first Guide of this series now issued deals with the Order UNGULATA or Hoofed Mammals. As this Order comprises all the Big-game animals of Malaysia except the Tiger, it was thought that a separate Guide would be useful. The remaining Mammals of Malaysia are grouped in the following Orders:—

PRIMATES—Apes, Monkeys and Lemurs.

CHIROPTERA—Bats.

INSECTIVORA—Shrews.

RODENTIA—Porcupines, Rats and Squirrels.

CARNIVORA—Cats, Dogs, Civets, Martens, Otters and Bears.

CETACEA—Whales, Dolphins and Porpoises.

SIRENIA—Manatis and Dugongs.

EDENTATA—Ant-eaters.

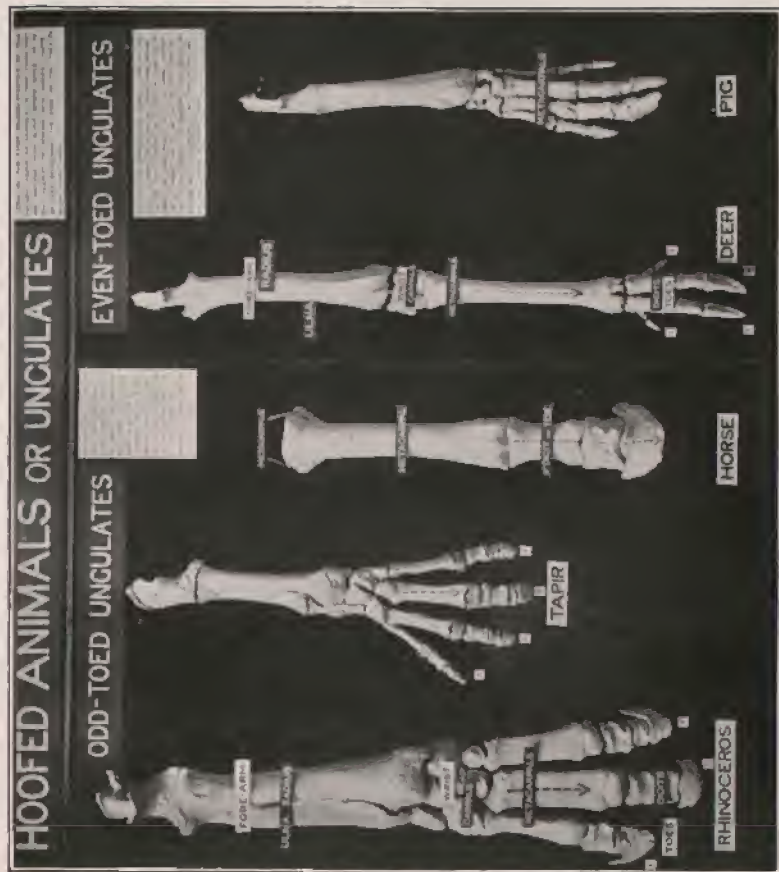
These will be described in a separate Guide.

The Ungulates described in this Guide include such well-known types as the Elephant, Rhinoceros, Tapir, Pig, Mouse-Deer, Deer, Oxen (*Seladang* and *Banting*), Buffalo and Goat-Antelope.

The geographical limits of the Malaysian Sub-region (which forms only a small part of the Oriental Region) are shewn in the accompanying map. For convenience this Sub-region may be defined on the north and south by Lat. 10° N. and 10° S. respectively and on the east and west by Long. 95° and 120° E., the latter bound-

ary however being modified to follow Wallace's line between Celebes and Borneo, Lombok and Bali. The Zoological collections of the Raffles Museum and its present collecting activities are limited to this square for which the collective name MALAYSIA may be used.

Of some 250,000 people who visit the Raffles Museum annually, about 5 per cent only are Europeans and perhaps 20 per cent only are able to read English. The remainder for the most part are illiterate or able to read only Malay, Chinese, Tamil or some other Eastern language. This Guide will therefore be of interest mainly to three classes of visitors: the English-speaking resident of Singapore, the traveller (of whom many thousands pass through en route for all parts of the world), and the Singapore school boy. To these it is hoped that this and subsequent Guides will serve as a useful Introduction to the wonders of Nature in Malaysia.



Light Studio

TYPES OF UNGULATE FEET
Exhibited in the Raffles Museum.

THE HOOFED MAMMALS, OR UNGULATES.

ORDER UNGULATA.

The Order UNGULATA comprises about 300 species, of which half occur in the Ethiopian Region, where the great Family BOVIDÆ predominates. Ungulates are found all over the World except in the Australian Region. The New World is particularly poor in them: only about 12 per cent of all the known species occur in that half of the globe.

Limbs.

[Plate I]

One of the general characteristics of most Mammals is that the fore and hind limbs have five digits, which are supplied with claws or thin nails. One important group, however, known as the Ungulates or Hoofed Mammals, differs from this general mammalian plan in the digits of the fore and hind-limbs being encased in solid hoofs. In a few cases broad flat nails take the place of the claws in other mammalian Orders. With the exception of the Elephant and some extinct species, the Ungulates never have more than four digits, while in some species the number is reduced to three, two, or even one as in the horse. These Hoofed Mammals are placed in the Order UNGULATA. A further peculiarity of the Ungulates is that the fore limbs are restricted to movement in one plane: lateral or rotatory movement of the fore limb, such as may be seen in other mammals, e.g. monkeys, cats, squirrels, is impossible.

Several well-known mammals fall into this Order: elephants, rhinoceros, cattle, horses, giraffes, camels, pigs and deer. Although differing so much in size and general appearance they all share this common character of the limbs, and therein differ from all other mammals.

The reduction of the usual mammalian five-toed limb to a more specialized type is of sufficient importance to merit a more detailed explanation. Ungulates are essentially terrestrial animals, for whom the development of strong walking or running powers has become essential; but the development of prehensile limbs has not proved necessary or taken place (except in the elephant whose prehensile trunk is useful enough to rank as a fifth "limb.")

Two lines of reduction can be traced: one from a three-toed to a one-toed state, the other from a four-toed to a two-toed state. Animals belonging to the former category are styled *Perissodactyla* or "Odd-toed Ungulates," while those in the latter are named *Artiodactyla* or "Even-toed Ungulates."

In Malaysia the Tapir and Rhinoceros represent the Odd-toed Ungulates, while the Pig, Deer, Oxen and Goat represent the Even-toed Ungulates. The Elephant is placed in a separate Sub-Order known as the *Proboscidea*, on account of its proboscis or trunk.

To attain greater running powers it is obvious that the lengthening of the five toes is not enough; a strengthening development also is necessary. This is attained by reducing the number of toes and strengthening those that remain. If the five toes were lengthened only, there would naturally be the danger of fracture. The strengthening therefore of the reduced number of toes, together with their encasement in hoofs, obviates this difficulty and at the same time results in a singularly perfect limb for the purpose required.

Starting from a five-toed type that walked partly on the soles of its feet—a “plantigrade” type—it is possible to trace the evolution of both groups to the present day forms that walk entirely on the tips of the toes—a “digitigrade” type. In the Odd-toed Sub-Order, the third toe develops while the first disappears, followed by the fifth, leaving only the third supported by the second and fourth. This is the stage reached by the Rhinoceros of to-day and the extinct three-toed Horse of the Pliocene. The modern horse has advanced still further, having lost both the second and fourth toes, leaving the remaining third toe alone but considerably strengthened.

In the other type the third and fourth toes develop symmetrically, while the first disappears, followed by the second and fifth. An intermediate stage is seen in the Pig where the second and fifth toes still persist in a small, reduced state, while the third and fourth have developed considerably. In the Deer and Oxen a general fusion of the metacarpals and metatarsals has taken place resulting in single strong bones terminating in the two-toed feet; the second and fifth toes also remain but in a more reduced state. In the Camel they disappear entirely.

The Ungulates have no collar-bones. Generally they are herbivorous animals; large in size; many species with horns.

Teeth.

Teeth are regarded by zoologists as of great importance as an aid to classification. The general type of mammalian dentition is expressed by the following formula:—

$$i \frac{3}{8}, c \frac{1}{1}, p \frac{4}{4}, m \frac{3}{8} = 11.*$$

This is for one side of the mouth only and should thus be doubled to give a total of 44 teeth altogether. As might be expected, mammalian teeth have become modified to meet different requirements: thus an insect-eating animal has developed different teeth from those of a cud-chewing animal. On this plan five groups of mammals may be separated: herbivorous, omnivorous, insectivorous, piscivorous and carnivorous. A description of the teeth of each type is unnecessary here, but, in passing, we may notice the carnivorous type, sharp, tearing teeth with very strong canines, required to seize and kill a struggling prey; the insectivorous type with long pointed central incisors formed to seize small active prey; the herbivorous type with incisors well developed for cutting off herbage, and large molars well adapted for grinding.

In the Ungulates there are two well-marked types of molars, one in which the surface bears tubercles, called the *bunodont* type, and the other bearing crescent-shaped ridges, known as the *selenodont* type.

Apart from the development of teeth for feeding purposes there is also in many species a special development for other purposes, e.g., fighting. Very remarkable forms of teeth of this nature are found among the Ungulates, as for instance the enormous incisors, commonly known as tusks, of the elephant, and the wild boar's tusks, which however are canines not incisors.

Horns.

Horns present another interesting feature in the Ungulates. There are three types exemplified by Malaysian mammals:—

- (i) The *korny-fibrous* growth from the skins of the rhinoceros,
- (ii) The *solid bony* antlers of the deer,
- (iii) The *hollow horns* of the oxen and goat.

The rhinoceros horn has no connection with the bones of the skull, although there is a bony protuberance under the horn itself. The horn is not shed; it grows throughout the life of the rhinoceros.

* The upper figures indicate the number of teeth on one side of the upper jaw, the lower figures those on one side of the lower jaw, commencing from the front with 3 incisors, followed by one canine, 4 pre-molars and 3 molars.

The total number of teeth on one side of the upper jaw is therefore 11, or 22 for the whole of the upper jaw, or 44 for both jaws.

The antlers of deer, however, may be described as a development of dead bone carried for a time and periodically shed by the living animal. The bony pedicles of "budding" antlers form part of the skull itself and are at first covered with skin, which covers the newly formed antler and on account of its fine hairy texture is known as the "velvet." The blood vessels of the velvet become constricted at the "burr" close to the skull; the "velvet" then dries up and is rubbed off. The antlers are then ready for fighting. After the pairing season they are shed.

The third type of horn is hollow, but permanent. It grows on a bony protuberance of the skull and is like the horn of the rhinoceros a modified growth of the skin tissues.

The distinctions between the three Sub-Orders into which Malaysian Ungulates can be separated have already been indicated above. The following key shows these differences at a glance:—

- | | | | | | |
|-----------------------|---|----|----|----|------------------------|
| <i>a</i> | A long flexible trunk | .. | .. | .. | <i>Proboscidea.</i> |
| <i>a</i> ¹ | No long flexible trunk. | | | | |
| <i>b</i> | Number of toes odd (except 4-toed fore feet of Tapir) | .. | .. | .. | <i>Perissodactyla.</i> |
| <i>b</i> ¹ | Number of toes even | .. | .. | .. | <i>Artiodactyla.</i> |



T. B. Hubback,

THE ASIATIC ELEPHANT

Shot by Mr. T. R. Hubback in the Malay Peninsula.

LONG-NOSED UNGULATES.

(*Sub-Order I. Proboscidea*).

ELEPHANTS.

(Fam. 1. *ELEPHANTIDAE*).

1. *THE ASIATIC ELEPHANT.*

[Plate II]

Elephas maximus.

Malay: **Gajah.**

Malaysia cannot offer hunters the attractions of Africa in quantity or variety of Big-game. Besides the Elephant, the hunter's choice is practically limited to Rhinoceros, Seladang and Tiger. The Elephant found in Malaysia is still comparatively plentiful in certain parts of the Malay Peninsula, North Borneo and Sumatra, and fine tuskers have been bagged within recent years.

The captive elephant in Zoological Gardens all over the world has always attracted attention on account of its huge size, great strength (enabling it to force its way through the thickest jungle), its remarkable intelligence and perhaps not least on account of its curious trunk, which gives it an appearance totally unlike that of any other animal. This trunk or proboscis is really a lengthened nose at whose extremity the nostrils can be seen, but it differs from the usually accepted type of nose in being a prehensile organ used for conveying food and water to the mouth. With its trunk the elephant can pick up the smallest object or tear up trees by the roots.

The feet of the elephant are very broad, the skin-covered pad containing five toes, whose position is indicated by broad flat nails. The legs are so formed that in kneeling the elephant stretches out its fore feet in front and its hind legs behind, thus differing from other Ungulates.

The skin is more or less without hair, very strong, almost armour-like and impervious to thorns and such like hindrances which would impede its progress through the tangled thickets of the jungle.

The head is enormous, but the brain and eyes relatively small. Lydekker goes so far as to say that "the size and structure of the brain is quite sufficient to prove that the intellectual capacity of elephants is far inferior to that of the dog, and is probably below that of most other Ungulates." The size of the head, although out of proportion to the brain, is obviously necessary when we consider the bulk of the ani-

mal and the enormous amount of food it must require. Elephants are herbivorous. They are accordingly supplied with gigantic molars (16" long, 4" wide) for crushing their food. As these wear out they are replaced by others moving up from behind. The bones of the skull are exceptionally thick, but the weight is counterbalanced by large air-cavities in the skull above the brain.

Ivory tusks, which, as already noted, are incisors and not canines as in the pig or hippopotamus, are usually developed in the males and occasionally in the females. Big tusks reach from 5 to 8 feet in length, 16 to 17 inches in circumference at the base and up to 100 lbs. in weight the pair; in the Indian form up to 150 lbs. Hubback states that big tuskers in the Malay Peninsula seldom carry tusks weighing over 60 lbs. the pair. He mentions one said to have been shot by Lebai Jemal, a Malay, in Jelebu many years ago whose tusks weighed over a *pikul* (133½ lbs.), but adds "I am inclined to think that their weight must have increased with old Lebai's age!" In breaking off branches of trees with its trunk the elephant breaks them against its tusks. Both trunk and tusks are also used for defensive purposes.

The biggest elephant Hubback himself ever shot in the Malay Peninsula measured 9 ft. 3 in. at the shoulder. The average height is between 8 and 9 ft. A giant skeleton in the Indian Museum stands over 11 ft. and when alive the animal must have measured about 12 ft. A curious point is that twice the circumference of the fore foot is said to equal the height at the shoulder.

The weight of an 8 ft. elephant is between 2 and 3 tons.

Occasionally so-called white elephants, which are really albinos, are found. Among other abnormalities, Hubback records having shot an old one without the vestige of a tail; he scouts the idea that it could have been lost through fighting, although it is well-known that elephants do bite off portions of one another's tails when fighting.

Elephants have been known to live in captivity for over a century and it is thought that an age of 150 years is not an excessive estimate for the age of an elephant in the wild state.

The Indian Elephant ranges from India and Ceylon eastwards to Siam, Cochin-China, and Malaysia (excluding Java).

Those found in the Malay Peninsula and Sumatra have been given distinctive names as separate subspecies, while the elephant in North Borneo, which was almost certainly introduced from the Malay Peninsula, is probably inseparable from that form. That the Elephant was at one time indigenous in Borneo is proved by the discovery by Shelford of a

fossil elephant tooth in Sarawak. This, however, is held by some to represent another species now extinct. Until recently the elephant was found all over the Malay Peninsula, except of course in the islands of Penang and Singapore; but with the march of civilization its habitats are becoming more restricted.

A different species occurs in Africa. "Jumbo" for many years a celebrity in the London Zoo belonged to this species. The largest known tusk appears to be one in the British Museum; it measures 10 ft. 2 in. in length and weighs 228 lbs. The African elephant is more difficult to tame than its Asiatic cousin, and is likely to be exterminated through continual persecution by ivory-hunters.

These are the only two species now in existence, but in comparatively recent times an allied species, *E. primigenius*, the Mammoth, existed in Northern Siberia, where frozen carcasses are found to this day.

Although gifted with poor sight, elephants have particularly keen senses of smell and hearing—the great flap-like ears when erected catching the smallest sound. Elephants are strictly herbivorous; they go about in herds of 20 or more, resting during the heat of the day. Solitary male elephants, known as "rogues," are also to be met with. They do considerable damage to crops and are dangerous animals to meet. Hubback¹, whose interesting book entitled "Elephant and Seladang Hunting in the Federated Malay States" should be read by every one interested in the Big-game of Malaya, gives a thrilling account of trying to stop a charging elephant with a bullet at two yards range,—when his rifle misfired!

Domesticated elephants have been used from time immemorial, as for instance by the Persians and Romans in battle. To-day they are used in India and Burma for transport purposes, notably for dragging timber from the depths of the jungle to the rivers. Schmeil² states that a tame male can carry a load of nearly a ton. In Perak and old Malacca they have been domesticated, probably under Siamese instruction originally, and in Upper Perak they are still used for transport.³ They are also much used for sporting purposes, especially in tiger-shooting when they carry a howdah from which the sportsman gets a better chance of a successful shot.

¹ Hubback, p. 15.

² Schmeil, p. 90.

³ Dr. Winstedt kindly informs me that in an XVIIIth century history of Perak the story is told of how Sultan Iskandar, better known as Marhum Kahar, sent Tambi Kechil, a Tamil, with one wife in Perak and another in India, to the land of the Klings to fetch a man to buy elephants. He returned with one Nakhoda Pakir Sa'ib Maba and received a title (Raja Mutabar Khan) for his pains. The trader came to court with offerings of many strange foreign presents; he brought elephants—how many is not said—and the Sultan made him a free gift of two.

ODD-TOED UNGULATES.

(Sub-Order 2. *Perissodactyla*).

The Horse, Tapir and Rhinoceros are the only existing representatives of this Sub-Order of Ungulates—distinguished by the arrangement of the toes. The Horse Family EQUIDÆ is not represented in Malaysia. It includes species of the Horse, Ass and Zebra.

The differences between the two Malaysian Families of this Sub-Order are easily stated:—

- | | |
|---|------------------------|
| <i>a</i> No horns; fore feet with four toes, hind feet
with three toes | <i>Tapiridæ</i> . |
| <i>a</i> ¹ One, or two, horns on the nose; all feet with
three toes | <i>Rhinocerotidæ</i> . |

TAPIRS

(Fam. 2. *TAPIRIDÆ*).

2. *THE MALAYAN TAPIR*.

[Plate III]

Tapirus indicus.

Malay: **Tenok, Badak himpit or Badak tampong.**

The Malayan Tapir is a stoutly built animal easily recognized by the four-toed fore feet and three-toed hind feet, the short proboscis or snout, and the parti-coloured body, of which the fore-part is blackish-brown and the rest, with the exception of the hind legs, greyish white. The young are marked with broad longitudinal white streaks and spots, which however soon disappear as the young tapir grows. The height of the tapir is about 3 ft. to 3 ft. 6 in. at the shoulder. It produces no tusks as in the elephant, and no horns as in the rhinoceros or many other Ungulates.

It is a harmless, solitary, timid animal, frequenting swampy forests, where it lives on twigs, leaves and fruit. It swims and dives. It is not difficult to tame and has been kept successfully in different Zoological Gardens.

In the Malay Peninsula it is by no means uncommon, sometimes visiting rubber estates, although for the most part keeping to moist or less populated places.

In Malaysia the Tapir is found in the Malay Peninsula and Sumatra, but not, so far as is known, in Borneo (except on some of the stamps of the British North Borneo Company). Pleistocene fossil remains have been found in Java.



Light Studio

YOUNG MALAYAN TAPIR.

The existing Tapirs have a very curious distribution. Besides the Malayan Tapir with its restricted range in the South-eastern corner of Asia, there are only four other species known, all of which are confined to Central and South America. A further curious feature is that two of these American Tapirs are more closely related to the Malayan Tapir than they are to the other two American species. This is explained by the discovery of extinct Tapirs in the middle and upper Tertiary rocks of Europe, China and North America, thus showing that these animals had at one time a very much wider range than they have now. These extinct forms are very closely allied to existing forms: our surviving Tapirs are on that account regarded as "living fossils" and among the oldest of living mammals.

The Tapir offers no trophies in the shape of horns or tusks to attract the attentions of the big-game hunter. His chief enemy in Malaysia is probably the Tiger. But its protective coloration, especially in the young, its retiring habits and quickness of senses, no doubt give it a good chance of escape.

RHINOCEROSSES.

(Fam. 3. *RHINOCEROTIDAE*).

Five species of Rhinoceros exist today: two in Africa, and three in East India and Malaysia. The general characters are the great bulk and heavy build; exceptionally thick skin folded in places so as to give somewhat of an armour-plated effect; the heavy nose bearing one or two horns placed in the median line; the three-toed fore feet (although in some extinct species the fore feet have four toes as in the tapirs); ears erect; eyes small.

Of the Asiatic rhinoceroses, the largest is the Indian species which stands from 5 to 5½ feet at the shoulder; the length from tip of snout to root of tail is about 10 ft. and the girth 9 ft. This species is practically confined to Assam.

The Javan rhinoceros is the next in point of size and, like the Indian species, has only one horn. The smallest is the Sumatran rhinoceros, which is further characterized by the presence of two horns instead of one.

Although generally a timid animal the rhinoceros is often known to charge its foes when attacked; its senses of hearing and smell are keen, but owing to its weak sight and no doubt on account of its heavy build, the rhinoceros only charges straight in the presumed direction of its foe. A quick step to the side is all that is

necessary to let the beast go dashing by harmlessly. They are said to charge with their mouths open, endeavouring to use their teeth, not their horns as one might suppose.

They feed on grass, shrubs, shoots and leaves of trees; resting during the heat of the day. Mud wallows or "salt licks" are favourite places where they may be found by the hunter. They are becoming increasingly rare and perhaps the day is not far distant, when like their African cousin the so-called White Rhinoceros, they will become practically extinct.

The two African rhinos reach a height of $5\frac{1}{2}$ to $6\frac{1}{2}$ feet at the shoulder; they are commonly known as the Black and White Rhinoceroses respectively, although in point of fact the colour distinctions are negligible. The latter species provides the longest known rhinoceros horn (in the British Museum) which is 4 ft. 8½ in.

The two Malaysian species are easily separated:—

a	About 5 ft. at shoulder, one-horned, almost hairless	<i>R. sondaicus.</i>
a	About 4 ft. at shoulder, two-horned, moderately hairy	<i>R. sumatrensis.</i>

3. THE JAVAN RHINOCEROS.

Rhinoceros sondaicus.

Malay: **Badak.**

The single horn, almost naked skin, heavy folds at neck, shoulder and hip, and larger size distinguish this species from the only other Malaysian rhinoceros. It stands over 5 ft. at the shoulder.

A fine horn of this species in the British Museum measures 10½ in. in length and 19½ in. in circumference. But generally speaking the horns are never large.

This species has a comparatively wide range, from Eastern Bengal through Burma and the Malay Peninsula to Sumatra and Java. The reports of its occurrence in Borneo need confirmation, although records of partially fossilized remains from that island show that it certainly occurred there once even if it no longer does so. It is a rare species throughout its range and probably nearing extinction. One of the few specimens obtained in the Malay Peninsula was shot by Mr. W. G. Maxwell in Kinta, Perak.¹

This particular beast acquired considerable fame as the Pinjih rhino. It haunted the Pinjih valley in Perak. Maxwell states that it had been the terror of the neighbourhood

¹ In Malay Forests, pp. 12-46.



T. R. Hubback.

THE SUMATRAN RHINOCEROS

Shot by Mr. T. R. Hubback in the Malay Peninsula.

long before the British occupation of Perak (1874) and continued so twenty-five years later. The natives credited it with supernatural powers and believed it to be protected by a guardian spirit. It was particularly savage and had killed three men at different times, while the most determined attacks on it failed ignominiously. Once a party of five picked Malays met the rhinoceros and fired fifty shots at it. Maxwell devotes a chapter to an account of this beast, and his eventual triumph over it, in his interesting book "In Malay Forests."

Measured between two upright posts at the shoulder and fore feet its height was 5 ft. 5½ in., but Maxwell thinks it was actually little short of 6 ft. when alive, as it had fallen in a cramped position and could not be stretched out. The horn he states was disappointingly small, "a short shapeless lump only some seven or eight inches high," although probably longer once as the tip had been broken off and the base was much worn and splintered.

4. *THE SUMATRAN RHINOCEROS.*

[Plate IV]

Rhinoceros sumatrensis.

Malay: **Badak** or **badak kerbau.**

As already remarked this is the smallest of the Asiatic rhinoceroses, in fact of all living rhinoceroses. Besides the additional horn, it is further characterized by the comparative hairiness of the skin. It stands about 4 ft. in height at the shoulder, with a length from the tip of the nose to the root of the tail, of about 8 ft.

Rowland Ward gives the following measurements for three unlocalized horns in the British Museum:—length 32½, 27½, and 9½ inches and circumference at base 17½, 17½ and 14½ inches. Bartlett records a Bornean horn 19 inches long and 16 inches in circumference.

This species ranges from Burma and Siam through the Malay Peninsula to Sumatra and Borneo. It does not, however, occur in Java. The island form is regarded as subspecifically distinct from the continental form.

In the Malay Peninsula it is comparatively common, and at one time the natives in the Dindings made a profitable trade out of the capture and export of living rhinoceroses. Last year (1921) two were sent to Singapore for shipment. One was reported to have been sold for \$4,000 and sent to Japan.

Apart from its value for Zoological Gardens, the rhinoceros is persecuted on account of the horn, hide and other portions of its anatomy, which are valued highly by Chinese for medicinal purposes.

EVEN-TOED UNGULATES.

(Sub-Order 3. *Artiodactyla*).

The remaining Ungulates of Malaysia fall into the "Cloven-hoofed" group, characterized among other things by the equal development of the third and fourth toes, between which the median line of the whole foot is drawn. The group, so far as Malaysia is concerned, includes Pig, Deer, Goats and Oxen.

The following key shows how these animals are classified into different Families:—

- a Non-ruminant¹; teeth bunodont²; one pair of upper incisors present *Suidae*.
- a¹ Ruminant; teeth selenodont³; no incisors.
 - b Hornless; under 14 inches in height at the shoulder *Tragulidae*.
 - b¹ Horned (but not always in females), 2 to 6 feet in height.
 - c Horns branched, deciduous and solid *Cervidae*.
 - c¹ Horns unbranched, permanent and hollow *Bovidae*.

The Even-toed Ungulates are now the dominant group of the Order. The great majority of species are found in the Old World, particularly in Africa which may be regarded as the present headquarters of the group.

Three remarkable animals, which do not occur in Malaysia, deserve passing mention, as they are placed in this Sub-Order. They are the Giraffe, which is confined to Africa; the Camel, of which there are two species—the one-humped from Arabia and the two-humped from Central Asia; and the Hippopotamus which is only found in Africa.

PIGS

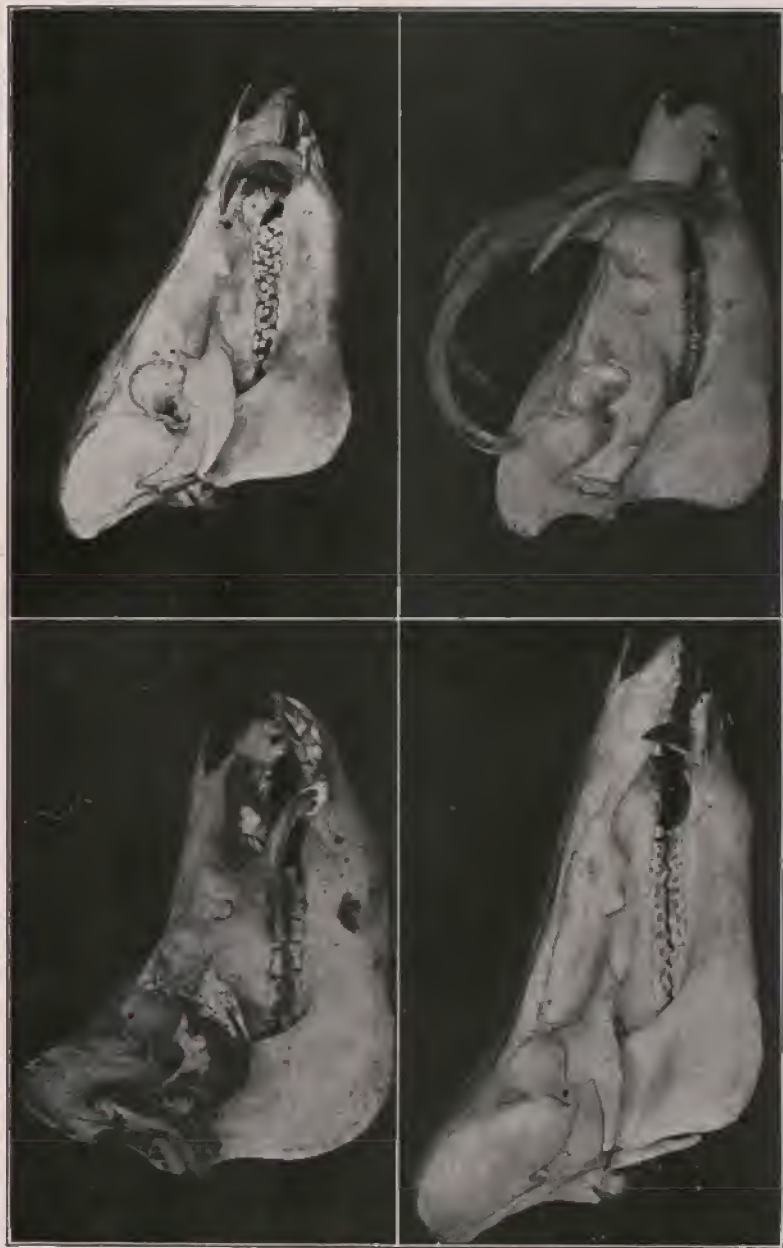
(Fam. 4. *SUIDAE*).

The appearance of the Pig is too well-known to need detailed description. Briefly the points to notice are: the long conical head with laterally compressed body together giving a wedge-like appearance and helping it to force its way through the thickest jungle; the elongated mobile snout; the feet with four toes, of which the two middle toes alone are used in walking; teeth typically 44 in number; upper canines curved outwards and upwards, helping it to plough up the ground in search of food.

¹ "Ruminant" animals after swallowing their food bring it up again to chew. Pigs, alone of the Malaysian Even-toed Ungulates, are not ruminant.

² "Bunodont" or "hillock-toothed": molars whose crowns are broad, flattened and elevated into rounded tubercles.

³ In "Selenodont" teeth the crowns of the molars when worn show crescent-like or trefoil patterns.



V. Knight

TYPES OF PIG SKULLS
Exhibited in the Raffles Museum.

The Domestic Pig
The Bearded Pig

The Wild Pig
The Babirusa

Wild Pigs are found almost all over the Old World as far East as New Guinea. In many parts of the world such as America and New Zealand domesticated pigs have been turned loose and have formed wild races. But strictly speaking the wild pigs are confined to the Old World. In the New World they are replaced by another Family of Pig-like animals called Peccaries. A third Family of the Pig-like group contains the Hippopotamus which is now confined to Africa, although fossil remains from England, the Himalayas and Burma show that at one time it had a wider range and may possibly even have extended into Malaysia.

The wild pigs of Malaysia are broadly separable into three species:—

- a Without warts on the face; young striped .. *S. scrofa*.
- a¹ With one large bristled wart on each side of the face; cheeks fringed with long hair; skull elongated; young striped *S. barbatus*.
- a² With three small warts on each side of the face; young uniformly coloured *S. verrucosus*.

A great number of pigs have been described from different parts of Malaysia, and considerable uncertainty still continues as to the relative values of the different "species" and "subspecies" and as to their relationship one to the other.

A distinction between wild pigs and domesticated pigs, given by Lydekker, is the straightness of the profile in the former compared with the more or less concave profile in the latter.

The origin of domesticated pigs has been debated at considerable length; the most probable view apparently being that domesticated races in different parts of the world have been derived from the wild pigs of the same areas. But crossing between different domesticated races no doubt has taken place on a considerable scale.

One remarkable pig, although outside the Malaysian sub-region (as defined for the purposes of this Museum) is the Babirusa of Celebes. It is almost hairless. In the male the tusks of the upper jaw come right through the skin of the face, instead of protruding from the jaw. They are enormously developed and curled upwards and backwards over the face as if in protection of the eyes. The lower tusks are also strongly developed having a similar curved sweep upwards and backwards. It is not known of what use they are to the animal in this form (see Plate V).

5. THE WILD PIG or WILD BOAR.

[Plate V]

Sus scrofa.

Malay: **Babi utan.**

The Malaysian Wild Pig has been generally regarded as a distinct species, but in accordance with more modern views and perhaps a broader conception of the term "species," it is not unreasonable to regard it as only a geographical race of the Wild Boar of Europe which is still abundant in many

parts of Europe. It existed in the British Isles up to about 1,600 A.D. It ranges now as far as Central Asia and North Africa. In India it is replaced by a rather larger, crested form (*S. s. cristatus*), very similar to (and, in the opinion of some, hardly separable from) the European *S. s. scrofa*. The Indian Boar stands about 3 ft. at the shoulder, and weighs from 200 to 300 lbs. or more. There is a record of one over 43½ inches in height. Tusks (when extracted from the lower jaw) measure 8 to 10 inches.

Sows and young pig go about together in droves of a dozen or so, but old boars are solitary. Pigs are very prolific; they produce about two litters a year, from six to ten young at a time; the period of gestation is four months.

Wild pigs in Malaysia do a lot of damage to crops. From their habit of turning up the ground with their snouts in search of young roots for food, they leave marks easily recognizable. But they are not particular as to food and will feed on dead animals or anything they can find.

The Wild Boar is a pugnacious animal when provoked. There are records of boars in India having attacked or killed tigers. The lower tusks grind against the upper ones and are thus kept particularly sharp. They are most formidable weapons, capable of ripping open any foe.

Rowland Ward gives the lengths (outside curve) of nine Indian tusks, ranging from 7½ in. to 10 in.

In Malaysia a rather smaller form than the Indian one ranges throughout the Malay Peninsula, Sumatra, Java and adjacent small islands, divided up by various authorities into several geographical races. It rarely exceeds 2 ft. 6 in. in height at the shoulder.

The young are striped, rather like the young of the Tapir. In Sumatra, Java and the southern part of the Malay Peninsula, the adult has a light streak on either side of the face, which is however, absent in those from the North of the Malay Peninsula.

The report of a form of the Common Wild Pig in Borneo is open to question. It reaches the Rhio Archipelago and the Natuna Islands, but seems to be entirely replaced in Borneo by the larger Bearded Pig. It is interesting to note however that both species occur together in the Rhio Archipelago, Pahang and Sumatra.

6. THE CELEBES WILD PIG.

Sus celebensis.

In Celebes occurs a form of Wild Pig which is intermediate in some ways between the Bearded Pig of Borneo, the Striped Pig of the Malay Peninsula and the Wart Pig of



Light Studio

THE BEARDED PIG

From Rhio Archipelago; exhibited in the Raffles Museum.

JAVA. Its range includes the Philippines, Batjan and other islands outside the Malaysian subregion. One subspecies however has been described from Borneo, based on a single skull collected by Wallace and purchased by the British Museum in 1859. The occurrence in Borneo of a Celebes form of wild pig is rather unlikely and the more to be questioned since no other specimen has ever been recorded. A confusion of locality labels is a possible explanation; "Bouru," for instance, has often been read for "Borneo" and *vice versa* on collectors' labels.

It differs from the Bearded Pig of Borneo in the smaller size, less elongated head and smaller tail-tuft.

7. THE BEARDED PIG.

[Plate VI]

Sus barbatus.

This species besides the peculiarity of the cheek fringes or "beard" is noticeable for its larger size, long, low, narrow head, bearing a pair of prominent bristled warts; large tail-tuft, and comparatively small oval ears. It stands about 3 ft. at the shoulder; yellowish to blackish in colour.

This species ranges from Borneo, Sumatra and the Rhio Archipelago to the Philippines. Its discovery in Pahang (Malay Peninsula) has been recently confirmed.¹

8. THE GIANT BORNEAN PIG.

Sus gargantua.

One very large skull measuring 2 inches longer, and noticeably lower, than the largest specimen of the ordinary Bornean Bearded Pig has been described from South-East Borneo.

It is perhaps equally reasonable to regard it as an abnormal example of *S. barbatus* as it is to treat it as a separate species.

The Malays in the interior of Eastern Sumatra and in some of the adjacent islands report the existence of a very large pig, which they regard as quite distinct from the ordinary Bearded Pig. It is nomadic, consorts in droves and is much larger. They call it the *babi branti*. No specimen has yet been obtained.²

¹ H. C. Robinson and J. C. Moulton, Journ. Str. Br., R. A. S., No. 85, 1922.

² C. Boden Kloss, Journ. Str. Br., R. A. S., No. 83, 1921, p. 150.

9. THE JAVAN WART-PIG.

Sus verrucosus.

The peculiarity of this species is the presence of three pairs of small bristled warts on the face. Other characters are the well-developed mane, rather large ears, tuft-less tail, uniform blackish colouring of the young instead of the usual striped coloration. The adult is black except for the rufous underparts and head-bands. It is confined to Java.

RUMINANTS

The best-known Ruminant is the domestic ox, whose importance to man in providing meat, fat, milk and hide, coupled with its uses as a draught animal, cannot be exaggerated. Ruminants are herbivorous. The teeth accordingly are modified for this purpose. The incisors are usually long and large, directed obliquely forwards, to assist the animal in cutting off short grass. The upper edge of the jaw is toothless; the tongue is long and rough. The stomach is divided into four compartments of which the first two are used as temporary receptacles prior to the chewing process.

MOUSE-DEER OR CHEVROTAINS.

(Fam. 5. *TRAGULIDAE*).

The Mouse-Deer are the oldest of living Ruminants, and in spite of their name show more points of relationship to the Pigs than to the true Deer.

They are readily recognizable on account of their very small size, standing about a foot high at the shoulder. The limbs are particularly slender, the rump elevated. They have no horns; the males have long sharp tusks in the upper jaw directed downwards and backwards; the legs are very slender. They are shy little animals of the forest, most active about sunset.

Mouse-Deer are found only from India to Annam and Malaysia (*Tragulus*) and in Equatorial Africa (*Dorcatherium*). From Malaysia some 50 different forms have been described, but all may be reduced to two species, the *napu* (*T. javanicus*) and the *plandok* (*T. kanchil*), each of which however has developed well-marked geographical races on many of the small islands of Malaysia.



Light stuffo.

THE SMALLER MOUSE-DEER OR PLANDOK
Exhibited in the Raffles Museum.

The differences between these two species may be summarized thus:—

- a Length of head and body 20-22 inches. Hind foot $5\frac{1}{2}$ to 6 in. General colouring usually smoky grey. White outer throat stripe broken or deflected in centre *T. javanicus*.
- a¹ Length of head and body about 18 inches. Hind foot $4\frac{1}{2}$ to 5 in. General colouring usually rufous. White outer throat stripe straight from jaw to shoulder *T. kanchil*.

10. THE LARGER MOUSE-DEER or NAPU.

Tragulus javanicus.

Malay: **Napu** or **Munkonong**.

This and the next species are found throughout Malaysia, extending northwards to Siam, and in the case of the *Napu* to Cambodia and Cochin-China in addition. The *Napu* is the rarer of the two; it frequents more swampy country.

11. THE SMALLER MOUSE-DEER or PLANDOK.

Tragulus kanchil.

[Plate VII]

Malay: **Plandok** or **Kanchil**.

The Mouse-Deer is the favourite hero in Malayan Folk-tales. It is credited with wonderful powers of resource and cunning. Its triumphs over the powerful beasts of the jungle, its escapes from terrible dangers, all form the subject of fascinating tales very similar to the European Folk-tales of Reynard the Fox or those in "Uncle Remus" about the inimitable Brer Rabbit. I quote two short Mouse-Deer tales from Skeat¹ and Winstedt², whose writings should be consulted by anyone interested in these picturesque tales.

THE TIGER AND THE SHADOW.

There was a "salt-lick" in the jungle to which all the beasts of the forest resorted, but they were greatly afraid by reason of an old Tiger which killed one of them every day. At length, therefore, Plandok the Mouse-Deer said to the Tiger, "Why not permit me to bring you a beast every day, to save you hunting for your food?" The Tiger consented and Plandok went off to make arrangement with the beasts. But he could not persuade any of them to go, and after three days he set off, taking nobody with him but Kuwis the smallest of the Flying Squirrels. On their arrival—Plandok said to

¹ Skeat pp. 28-29.

² Winstedt p. 64.

the Tiger. "I could not bring you any of the other beasts because the way was blocked by a fat old Tiger with a Flying Squirrel sitting astride its muzzle." On hearing this the Tiger exclaimed, "Let us go and find it and drive it away." The three therefore set out, the Flying Squirrel perched upon the Tiger's muzzle and the Mouse-Deer sitting astride upon its hind quarters. On reaching the river, the Mouse-Deer pointed to the Tiger's likeness in the water and exclaimed, "Look there! That is the fat old Tiger that I saw." On hearing this, the Tiger sprang into the river to attack his own shadow, and was drowned immediately.

THE MOUSE-DEER AND THE CROCODILES.

The Mouse-Deer journeying through the jungle came to a great river and he wondered how he should get across it and at the same time escape his enemies the crocodiles. After a while he thought of a plan. Accordingly he drew near to the bank and cried out, "Hi, all ye crocodiles, rise, float, I command you." "Pray, who is this that commands us?" asked a crocodile, lifting his head. "I am the messenger of Nabi Sleyman," replied the Mouse-Deer. "Rise, ye crocodiles in this river: for it is the will of the prophet Sleyman that I count all you his slaves: in the name of Nabi Sleyman I conjure you rise and float." Then all the crocodiles floated on the top of the water. "Come, all of you, herd together," said the Mouse-Deer, "or I cannot count you truly." And all the crocodiles crowded together, till they stretched from one bank of the river to the other. "I will count you one by one," said the Mouse-Deer, "so that there shall be no mistake in my reckoning." "One," said he, as he leapt from the bank on to the back of the nearest beast: "two" and he leapt on to the back of the next; "three," and he was on the back of a third: "four, five, six, seven, eight, nine, ten,—done," said he, as he jumped to the opposite bank: "I reckoned truly, and now that my reckoning has brought me across, you may sink, you foolish crocodiles."

THE SOLID-HORNED RUMINANTS.

(Fam. 6. *CERVIDAE*).

This Family includes all the true Deer, characterized by solid horns, or antlers, which are periodically shed. The Reindeer, Elk, Red Deer, Fallow Deer, Roe Deer, Musk Deer are included. Deer occur all over the world with the rather curious exception of Africa, which is so rich in species of *BOVIDAE* (Oxen and Goats), and Australia which, as already noted, is entirely without Ungulates. In

Malaysia only two types occur, viz. the Rusa or Sambur and the Muntjacs or Barking Deer. The differences between the two may be conveniently summarized thus:—

- | | | |
|----------------|--|-------------------|
| a | Height about 5 ft. at shoulder; antlers generally 3-branched, long, springing from short pedicles; lateral horny toes large. Males without tusk-like upper canines | <i>Cervus.</i> |
| a ¹ | Height under 2 ft. at shoulder; antlers generally 2-branched, short, springing from long pedicles; lateral horny toes small. Males with tusk-like upper canines | <i>Muntiacus.</i> |

The antlers of the Sambur are distinguished from those of other deer in that the brow-tine is given off from the beam at an acute angle, not at a right angle.

Each antler has three *lines* or *points*, the lowest known as the *brow-tine*, the next as the *bez-tine* and the summit of the main or *beam* of the antler, known as the *surroyal* or *crown* of the antler. The bez-tine, which is another point given off immediately above the brow-tine, is absent in the Sambur. The *trez-tine* of the Sambur is perhaps more correctly regarded as a branch of the crown of the antler; in which case the antler of the Sambur may be characterized as having one *brow-tine* and a long *beam* forked at the end.

A large orifice or "lachrymal pit" in front of each eye is very noticeable in all true Deer.

The young of the Sambur are usually uniformly coloured, but spotted in the Muntjac.

12. KUHLS STAG.

Cervus kuhli.

This is a small deer, about 27 inches at the shoulder, found only on Bawean Island between Java and Borneo. It differs noticeably from all the other Malaysian species in the longer antler-pedicles. The skull is more like that of a hog-deer and also lacks the tusks in the upper jaw.

Rowland Ward gives the following particulars of one head in the British Museum: length 9½ in., circumference 2½ in., tip to tip 10½ in., points 3 x 3.

¹ Except Kuhl's Stag from Bawean Island, which is barely more than 2 ft.

13. *THE JAVAN RUSA.*

Cervus timoriensis.

This species is confined to Java, Timor, Celebes and the Moluccas. It differs from the Rusa of the Malay Peninsula, Borneo and Sumatra in the more rufous colouring; in the hairs of the back which are annulated and longer; in the thinner antlers, which are not so rough, while the space between the horns is lyre-shaped instead of U- or V-shaped as in the Malayan Rusa.

Lydekker gives the measurements of fine antlers as from 33 to 37½ inches along the front curve, and the distance from tip to tip as 11½ to 25½ inches. The points are 3 x 3.

Reports of this species in Borneo and Sumatra are due to imported specimens.

14. *THE SAMBUR or EQUINE DEER.*

Cervus unicolor.

Malay: **Rusa.**

The typical Sambur Deer is a native of India; the Malayan Rusa is a geographical race, very closely allied. The main distinctions are the slightly larger size of the Indian form and the length of the terminal tines of the antlers; in the Indian form the front one is the shorter or about equal to the hind tine, while in the Malayan form the hind terminal tine is the shorter. This form has more white on the legs than the Indian form.

Two Malaysian races are recognized: *C. u. equinus* from the Malay Peninsula and Sumatra, and *C. u. brookei* a rather smaller form from Borneo.

Other races are described from Formosa, China, Marianne Islands, Philippines, all differing from the Indian and Malaysian forms in the shorter face and in having the shanks light instead of dark.

The male alone has antlers. It is also characterized by a mane which is absent in the female.

According to measurements of 10 Bornean antlers given by Rowland Ward the length varies from 11¾ to 23½ in., the circumference from 3½ to 7 in., and the tip to tip distance from 9¼ to 18¾ in.

Others without localities but presumably either from the Malay Peninsula, Sumatra or Borneo reach a length of over 30 inches and tip to tip measurement of over 20. One abnormally large head is recorded with a length of 30½ in. and 7 x 7 points instead of the normal 3 x 3.



Light Studio.

THE BARKING DEER
Exhibited in the Raffles Museum

Indian heads run to $46\frac{1}{2}$ inches in length and as much as $44\frac{1}{8}$ in. from tip to tip.

The Malayan Sambar is usually found singly or in company with two or three others, but rarely in herds of as many as a dozen. It feeds on grass, young shoots, leaves and wild fruits, chiefly at night, does much damage to native crops, and in many places wooden fences have to be erected round rice fields as a protection against deer. It is fairly common nearly everywhere. It occurs throughout the Malay Peninsula, including the island of Singapore, but not apparently on the island of Penang. Hose states that the pairing season in Borneo is about October and November. In India it is variable.

Natives of Borneo prize highly any malformed antlers; some tribes (e.g. Kalabits), more enterprising than others, keep unfortunate deer confined in low-roofed cages, which they say, has the effect of malforming the antlers. Certainly some very curious heads (in addition to smoked human heads) are to be seen in Kalabit houses in the interior of Borneo.

15. THE BARKING DEER or RIB-FACED DEER.

Muntiacus muntjak.

[Plate VIII]

Malay: **Kijang**.

The short, two-tined antlers, mounted on long bony pedicles as long as, or longer than, the antlers themselves, are the distinguishing feature of this Deer. In the skull it will be noticed that the pedicles are continued down the face as rib-like ridges, on account of which the name "Rib-faced Deer" has been applied. These ridges are apparent in the female as well as the male, although the male only has antlers.

Muntjacs stand a little less than 2 ft. at the shoulder; tawny-rufous in colour with whitish throat, belly and inner surface of the upper parts of the legs.

The males have long sharp curved tusks (canines) springing from the upper jaw.

The Muntjacs are solitary animals, very quick in the jungle, where they remain during the heat of the day, only coming out at sunrise or sunset to graze. They have a peculiar alarm-cry, a kind of hoarse bark, from which they are also known as "Barking-Deer." In India they are known as "Kakar."

Several different geographical races have been described, but with the exception of certain outlying members of the group from China and one from S. E. Borneo, all are perhaps

referable to one species known as *Muntiacus muntjak*. The range of this species is wide: it embraces India, Burma, Siam, Malay Peninsula, Borneo, Sumatra and Java.

It is fairly common throughout its range, but perhaps more local in its distribution.

16. THE PLEIHARI BARKING DEER.

Muntiacus pleiharicus.

A small yellowish Deer, recorded originally from Pleihari, S. Borneo, but since obtained by the F. M. S. Museums collectors in Sarawak. The antler pedicles and skull are shorter than in the ordinary Muntjac, which however appears to occur in the same locality. On this account *M. pleiharicus* is treated as a distinct species.

OXEN AND GOATS.

(Fam. 7. BOVIDÆ).

This Family contains the Oxen, Sheep, Antelopes and Goats. Under "Oxen" are included bison, gaur, cattle and buffaloes. So far as Malaysia is concerned the wild BOVIDÆ are poorly represented. In the Malay Peninsula are found the Gaur (*Selandang*), Banteng and Goat-Antelope (*Serow*); in Borneo the Banteng (*Tembadau*) and Water Buffalo; in Java the Banteng only, and in Sumatra the Goat-Antelope only.

These Malaysian species are separated into two Subfamilies (i) Oxen (*Bovinae*), and (ii) Goats (*Caprinae*), distinguished thus:—

- | | |
|---|---------------------|
| <i>a</i> About 5 ft. at the shoulder. Horns far apart and growing outwards from sides of head | <i>Bos.</i> |
| <i>a</i> ¹ About 3 ft. at the shoulder. Horns close together and growing upwards from forehead | <i>Capricornis.</i> |

The chief characters of the BOVIDÆ are the hollow horns which are not shed. Like the Deer and Mouse-deer already described, the BOVIDÆ lack the upper incisors and are cud-chewing animals, thus differing in both these characters from swine, which however share the common character of the even-toed feet.

Subfam. I. BOVINÆ.

The three Malaysian species are separated thus:—

- | | |
|--|--------------------|
| <i>a</i> Horns circular or oval in section. | |
| <i>b</i> No horny mass between horns. Forehead deeply concave. No white patch on buttocks | <i>B. gaurus.</i> |
| <i>b</i> ¹ Bases of horns connected by horny mass. Forehead flat or slightly convex. A white patch on the buttocks ¹ | <i>B. banteng.</i> |
| <i>a</i> ¹ Horns triangular in section | <i>B. bubalis.</i> |

¹ Except in the Malay Peninsula race.



T. R. Hubback.

THE GAUR OR SELADANG
Shot by Mr. T. R. Hubback Malay Peninsula.

Closely allied to these Oxen, although superficially very different, is the Anoa, only known from Celebes, which stands about 3 ft. high at the shoulder. Its horns are set rather close together and rise to nearly a foot in length.

17. THE GAUR.

[Plate IX]

Bos gaurus.

Malay: **Seladang.**

The Gaur is confined to India, Burma, French Indo-China (S. Annam) and the Malay Peninsula. Three geographical races are recognized, of which the Indian is perhaps the largest.

The Gaur is a heavily-built animal, remarkable for the high frontal ridge arched forwards to form a hollow in the forehead; also a high ridge on the fore part of the back. It differs structurally from the Bison, which is a North American animal, in having 13 ribs instead of 14.

The general colour of the Malayan race is brown, varying from reddish-brown in young bulls and cows to black-brown in old bulls. The lower parts of the legs are whitish. It stands from 5 ft. to 6 ft. at the shoulder.

At one time well-distributed throughout the Malay Peninsula, it is now much restricted in range. It is still comparatively plentiful in parts of Pahang, less so in Perak, Negri Sembilan and Johore, and apparently non-existent now in Selangor and the Straits Settlements. It keeps to more or less open grass country or bamboo thickets in preference to primeval jungle.

One of the largest pair of horns (from ulu Pahang) in the Raffles Museum measures $28\frac{1}{2}$ in. in length along the outside curve, and $18\frac{1}{2}$ inches in circumference at the base. The biggest mentioned by Hubback has a circumference of $20\frac{1}{2}$ in., tip to tip expanse of 33 in. and widest inside span of 40 in. This was a Seladang from Negri Sembilan and the horns are now in the Kuala Lumpur Museum.

Rowland Ward gives measurements of four Malayan heads, varying in length from $22\frac{1}{4}$ to $25\frac{3}{4}$ in., circumference 15 to $17\frac{1}{4}$ in., tip to tip $14\frac{1}{2}$ to $20\frac{3}{4}$ in. and greatest width inside measurement $22\frac{1}{4}$ to $26\frac{3}{4}$ in.

One of the largest Indian heads recorded by him measures $30\frac{1}{2}$ in. long, $17\frac{1}{2}$ in. circumference, $33\frac{3}{8}$ in. from tip to tip and $40\frac{1}{4}$ in. greatest width inside measurement.

The record, according to Dr. Hanitsch, is that of a Burmese head, whose horns measure $39\frac{1}{4}$ inches in length and $20\frac{1}{4}$ in. in circumference at the base.

The Gaur, or Seladang as it is known here, is the principal big-game animal of the Malay Peninsula. Mr. T. R. Hubback's book on "Elephant and Seladang Hunting in the Federated Malay States" has already been recommended to those interested in this sport. The Malayan race of the Gaur has been named after him: *Bos gaurus hubbacki*, a particularly suitable compliment in view of the amount he has done both in hunting the animal itself and in writing about this form of sport in Malaya.¹

18. THE BANTENG.

Bos banteng.

Malay: **Banteng** or **Tembadau**.

The Banteng is found wild in Java, Borneo, Malay Peninsula (north only), Burma, Siam and French Indo-China. It (or perhaps a hybrid) is kept in a domesticated state in Bali. The record of its occurrence further south in the Malay Peninsula rests on one skull (believed to be that of a cow) obtained in Perak. Lydekker points out however that "the possibility of its being nothing more than a feral race of the domesticated Bali bantén, which is largely imported into Singapore, should be borne in mind."

The Banteng is coloured much the same as the Seladang except for the whitish legs and white patch on the rump, which however was absent in the one specimen described from Perak. In size the Banteng is smaller and more lightly built than the Seladang; it stands a little over 5 ft. at the shoulder; the dorsal ridge is less marked; the horns are smaller and more slender, and in old bulls connected at the base by a horny shield. The forehead is flat or slightly convex.

Rowland Ward gives the measurements of ten Bornean heads varying in lengths from $14\frac{1}{2}$ to $21\frac{3}{4}$ in., in circumference from $10\frac{1}{2}$ to $12\frac{1}{4}$ in., tip to tip expanse from $7\frac{1}{2}$ to $18\frac{1}{2}$ in. and greatest width inside measurement from $11\frac{1}{4}$ to $22\frac{1}{2}$ in. The measurements of a single Javan head in the British Museum are given as, length $24\frac{3}{4}$ in., circumference $12\frac{1}{4}$ in., tip to tip $15\frac{3}{4}$ in., greatest width inside measurement $24\frac{1}{4}$ in.

¹ I am indebted to him for permission to use his photographs for the reproduction of Plates II, III and IV in this Guide.



THE WATER BUFFALO
In British North Borneo.

19. *THE INDIAN BUFFALO or WATER BUFFALO.**Bos bubalis.*

[Plate X]

Malay: **Kerbau.**

This Buffalo is found in a wild state in various parts of Ceylon, India, Burma, Indo-China, Borneo and possibly the Malay Peninsula. In a domesticated state it is well-known in Malaysia. It is possible that the wild herds found in Borneo are descended from escaped domesticated animals. They are rather smaller than the Indian race.

It stands about 5 ft. high at the shoulder, ashy-black in colour, with very little hair. The horns are very distinctive, being long, flattened, triangular in section. Long horns measured along the curve reach up to 6 ft. in length. One pair of horns in the Raffles Museum (probably from Siam) measure 56½ and 54½ inches respectively and from tip to tip in a straight line 58½ inches.

In Africa another species of Buffalo occurs, divided into numerous geographical races.

Subfam. II. *CAPRINAE.*20. *THE SEROW or GOAT-ANTELOPE.**Capricornis sumatrensis.*Malay: **Kambing gurun, Kambing goa.**

The Serow is allied both to Antelopes and Goats. It has a short tail, small horns, no beard. Different species are found from Japan, China, Indo-China and India south to Malaysia.

They inhabit hilly ground but occasionally are found near the coast. They are solitary animals, not rare in the Malay Peninsula, but difficult to obtain, on account of their habit of keeping to inaccessible limestone hills. Maxwell in his book "In Malay Forests" tells of the trials and troubles awaiting the sportsman who would hunt the Serow in Perak.

It stands about 3 ft. in height; the Malaysian races are blackish, tinged with grey or red in places, particularly the mane.

Rowland Ward gives the measurements of one Sumatran head in the British Museum as length 9 in., circumference 5 in., tip to tip 2 in., and others unlocalized, but in the same collection and presumably from the same country or possibly from the Malay Peninsula, ranging from 4½-8½ in. in length, 3¼-5½ in. in circumference and 1½ to 4½ in. from tip to tip.

It is not known from Java or Borneo, but according to native report exists in the latter country. It is rare in Sumatra.

Geographical Distribution
of
MALAYSIAN UNGULATES.

	Malay Peninsula.	Borneo.	Sumatra.	Java.
1. Asiatic Elephant	x	x	x	
2. Malay Tapir	x		x	
3. Smaller One-horned Rhinoceros	x	?	x	x
4. Sumatran Two-horned Rhinoceros	x	x	x	
5. Common Wild Pig	x	?	x	x
6. Celebes Pig		x		
7. Bearded Pig	x	x	x	
8. Giant Pig		x	x	
9. Javan Wart-Pig				x
10. Napu Mouse-Deer	x	x	x	x
11. Plandok Mouse-Deer	x	x	x	x
12. Kuhl's Stag				
13. Javan Rusa		(x)		x
14. Sambar	x	x	x	
15. Barking Deer	x	x	x	x
16. Pleihari Barking Deer		x		
17. Gaur	x			
18. Banteng	?	x		x
19. Indian Buffalo		x		
20. Serow	x	?	x	

No. 12. Kuhl's Stag is found in Bawean Island, near Java, but not in Java, Sumatra, Borneo or the Malay Peninsula.

No. 13. The Javan Rusa was introduced into Borneo.

A Nominal List
of
THE MALAYSIAN UNGULATES.

Note: MP = Malay Peninsula. S = Sumatra.
B = Borneo. J = Java.

Sub-Order I. PROBOSCIDEA.

Fam. I. Elephantidae.

- | | | |
|--------------------------|-------------------------------------|--------|
| 1. ELEPHAS MAXIMUS Linn. | { (a) <i>E. m. sumatranus</i> Temm. | S. |
| The Asiatic Elephant, | { (b) <i>E. m. hirsutus</i> Lydek. | MP, B. |

Sub-Order II. PERISSODACTYLA.

Fam. 2. Tapiridae.

- | | |
|--------------------------|--------|
| 2. TAPIRUS INDICUS Desm. | |
| The Malay Tapir. | MP, S. |

Fam. 3. Rhinocerotidae.

- | | | | | | | | | | | |
|-------------------------------------|---|--------|-----------------------------------|--------|--|-------------------------------|-----|--|-------------------------------|------|
| 3. RHINOCEROS SONDAICUS Desm. | | | | | | | | | | |
| The Smaller One-horned Rhinoceros. | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td>(a) <i>R. s. sondaicus</i> Desm.</td> <td style="text-align: right;">MP, J.</td> </tr> <tr> <td></td> <td>(b) <i>R. s. floweri</i> Gray</td> <td style="text-align: right;">S.</td> </tr> <tr> <td></td> <td>(c) <i>R. s. nasalis</i> Gray</td> <td style="text-align: right;">? B.</td> </tr> </table> | { | (a) <i>R. s. sondaicus</i> Desm. | MP, J. | | (b) <i>R. s. floweri</i> Gray | S. | | (c) <i>R. s. nasalis</i> Gray | ? B. |
| { | (a) <i>R. s. sondaicus</i> Desm. | MP, J. | | | | | | | | |
| | (b) <i>R. s. floweri</i> Gray | S. | | | | | | | | |
| | (c) <i>R. s. nasalis</i> Gray | ? B. | | | | | | | | |
| 4. RHINOCEROS SUMATRENSIS Cuv. | | | | | | | | | | |
| The Sumatran Two-horned Rhinoceros. | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td>(a) <i>R. s. sumatrensis</i> Cuv.</td> <td style="text-align: right;">B, S.</td> </tr> <tr> <td></td> <td>(b) <i>R. s. niger</i> Gray</td> <td style="text-align: right;">MP.</td> </tr> </table> | { | (a) <i>R. s. sumatrensis</i> Cuv. | B, S. | | (b) <i>R. s. niger</i> Gray | MP. | | | |
| { | (a) <i>R. s. sumatrensis</i> Cuv. | B, S. | | | | | | | | |
| | (b) <i>R. s. niger</i> Gray | MP. | | | | | | | | |

Sub-Order III. ARTIODACTYLA.

Fam. 4. Suidae.

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--|------------|---------------------------------|-----------|--|-------------------------------------|------------|--|--------------------------|--|--|---|--|--|--|----------|--|--------------------------------|----|--|--------------------------------------|--------|--|---------------------------------|------------|--|---|--|--|------------|--|--|-----------------------------------|---------|--|-------------------------------|-----------|--|------------------------------|---------|--|------------------------------------|---------|--|-------------------------------|------------|--|-------------------------------|------------|
| 5. SUS SCROFA Linn. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The Common Wild Pig. | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td>(a) <i>S. s. jubatus</i> Miller</td> <td style="text-align: right;">MP(North)</td> </tr> <tr> <td></td> <td>(b) <i>S. s. jubatulus</i> Miller</td> <td></td> </tr> <tr> <td></td> <td style="padding-left: 20px;">Langkawi and Terntau Is.</td> <td></td> </tr> <tr> <td></td> <td>(c) <i>S. s. vittatus</i> Mull. & Schleg.</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: right;">S. (?)B.</td> </tr> <tr> <td></td> <td>(d) <i>S. s. milleri</i> Jent.</td> <td style="text-align: right;">J.</td> </tr> <tr> <td></td> <td>(e) <i>S. s. peninsularis</i> Miller</td> <td style="text-align: right;">S, MP.</td> </tr> <tr> <td></td> <td>(f) <i>S. s. rhionis</i> Miller</td> <td style="text-align: right;">Karimon I.</td> </tr> <tr> <td></td> <td>(g) <i>S. s. andersoni</i> Thos. & Wrought.</td> <td></td> </tr> <tr> <td></td> <td style="padding-left: 20px;">Rhio Arch.</td> <td></td> </tr> <tr> <td></td> <td>(h) <i>S. s. niadensis</i> Miller</td> <td style="text-align: right;">Nias I.</td> </tr> <tr> <td></td> <td>(i) <i>S. s. enganus</i> Lyon</td> <td style="text-align: right;">Engano I.</td> </tr> <tr> <td></td> <td>(j) <i>S. s. babi</i> Miller</td> <td style="text-align: right;">Babi I.</td> </tr> <tr> <td></td> <td>(k) <i>S. s. natunensis</i> Miller</td> <td style="text-align: right;">Natunas</td> </tr> <tr> <td></td> <td>(l) <i>S. s. mimus</i> Miller</td> <td style="text-align: right;">Simalur I.</td> </tr> <tr> <td></td> <td>(m) <i>S. s. tuancus</i> Lyon</td> <td style="text-align: right;">Banjak Is.</td> </tr> </table> | { | (a) <i>S. s. jubatus</i> Miller | MP(North) | | (b) <i>S. s. jubatulus</i> Miller | | | Langkawi and Terntau Is. | | | (c) <i>S. s. vittatus</i> Mull. & Schleg. | | | | S. (?)B. | | (d) <i>S. s. milleri</i> Jent. | J. | | (e) <i>S. s. peninsularis</i> Miller | S, MP. | | (f) <i>S. s. rhionis</i> Miller | Karimon I. | | (g) <i>S. s. andersoni</i> Thos. & Wrought. | | | Rhio Arch. | | | (h) <i>S. s. niadensis</i> Miller | Nias I. | | (i) <i>S. s. enganus</i> Lyon | Engano I. | | (j) <i>S. s. babi</i> Miller | Babi I. | | (k) <i>S. s. natunensis</i> Miller | Natunas | | (l) <i>S. s. mimus</i> Miller | Simalur I. | | (m) <i>S. s. tuancus</i> Lyon | Banjak Is. |
| { | (a) <i>S. s. jubatus</i> Miller | MP(North) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (b) <i>S. s. jubatulus</i> Miller | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Langkawi and Terntau Is. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (c) <i>S. s. vittatus</i> Mull. & Schleg. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S. (?)B. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (d) <i>S. s. milleri</i> Jent. | J. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (e) <i>S. s. peninsularis</i> Miller | S, MP. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (f) <i>S. s. rhionis</i> Miller | Karimon I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (g) <i>S. s. andersoni</i> Thos. & Wrought. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rhio Arch. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (h) <i>S. s. niadensis</i> Miller | Nias I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (i) <i>S. s. enganus</i> Lyon | Engano I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (j) <i>S. s. babi</i> Miller | Babi I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (k) <i>S. s. natunensis</i> Miller | Natunas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (l) <i>S. s. mimus</i> Miller | Simalur I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (m) <i>S. s. tuancus</i> Lyon | Banjak Is. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. SUS CELEBENSIS Mull. & Schleg. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The Celebes Pig. | (a) <i>S. c. borneensis</i> Major B. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. SUS BARBATUS Mull. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| The Bearded Pig. | <table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td>(a) <i>S. b. barbatus</i> Mull.</td> <td style="text-align: right;">MP, B, S.</td> </tr> <tr> <td></td> <td>(b) <i>S. b. balabacensis</i> Major</td> <td style="text-align: right;">Balabac I.</td> </tr> </table> | { | (a) <i>S. b. barbatus</i> Mull. | MP, B, S. | | (b) <i>S. b. balabacensis</i> Major | Balabac I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| { | (a) <i>S. b. barbatus</i> Mull. | MP, B, S. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (b) <i>S. b. balabacensis</i> Major | Balabac I. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

8. *SUS GARGANTUA* Miller

The Giant Pig.

- (a) *S. g. gargantua* Miller S. E. Borneo
 (b) *S. g. branti* Kloss S.

9. *SUS VERRUCOSUS* Mull. & Schleg.

The Javan Wart-Pig.

J.

Fam. 5. Tragulidae.

10. *TRAGULUS JAVANICUS* Osbeck

The Napu Mouse-deer

- (a) *T. j. stanleyanus* Gray Batam I.
 (b) *T. j. rufulus* Miller Tioman I.
 (c) *T. j. formosus* Miller Bintang I.
 (d) *T. j. javanicus* Osb. J.
 (e) *T. j. napu* Cuv. MP. S.
 (f) *T. j. borneanus* Miller B.
 (g) *T. j. nigricans* Thos. Balabac I.
 (h) *T. j. terutus* Thos. & Wroughton Terutau I.
 (i) *T. j. umbrinus* Miller Langkawi I.
 (j) *T. j. pretiosus* Miller Lingga I.
 (k) *T. j. preticellus* Miller Bakong I.
 (l) *T. j. parallelus* Miller Sebang I.
 (m) *T. j. lutescens* Miller Sugi Bawa I.
 (n) *T. j. flavicollis* Miller Sugi I.
 (o) *T. j. bancanus* Lyon Banka I.
 (p) *T. j. nigricollis* Miller Sinkep I.
 (q) *T. j. nigrocinctus* Miller Kundur I.
 (r) *T. j. sebucus* Lyon Sebuko I.
 (s) *T. j. billitonis* Lyon Billiton I.
 (t) *T. j. amoenus* Miller Mansalar I.
 (u) *T. j. jugularis* Miller Mansalar I.
 (v) *T. j. bunguranensis* Miller Bunguran I.
 (w) *T. j. batuanus* Miller Batu I.
 (x) *T. j. niasis* Lyon Nias I.

11. *TRAGULUS KANCHIL* Raffles

The Plandok Mouse-Deer.

- (a) *T. k. kanchil* Raffles S.
 (b) *T. k. longipes* Lyon E. Sumatra.
 (c) *T. k. lutricollis* Lyon Banka I.
 (d) *T. k. subrufus* Miller Sinkep I.
 (e) *T. k. rubeus* Miller Bintang I.
 (f) *T. k. fulvicollis* Lyon Bengkalis I.
 (g) *T. k. carinatae* Miller Karimata I.
 (h) *T. k. brevipes* Miller Bangkaru I.
 (i) *T. k. pallidus* Miller Pulau Laut.
 (j) *T. k. fulvicenter* Gray Singapore.
 (k) *T. k. rarus* Miller Central & South MP.
 (l) *T. k. augustiae* Kloss North MP.
 (m) *T. k. ravulus* Miller Adang I.
 (n) *T. k. lancavensis* Miller Langkawi I.
 (o) *T. k. russens* Miller Tuanku I.
 (p) *T. k. russulus* Miller Batu I.
 (q) *T. k. hosei* Bonh. B.
 (r) *T. k. everetti* Bonh. Bunguran I.
 (s) *T. k. pelandoc* H. Smith J.
 (t) *T. k. penangensis* Kloss Penang I.
 (u) *T. k. pinus* Lyon Pinie I.
 (v) *T. k. masae* Lyon Tana Masa I.

Fam. 6. Cervidae.

12. CERVUS KUHLI Mull. & Schleg.

Kuhl's Stag.

Bawean I.

13. CERVUS TIMORIENSIS Blainv.

The Javan Rusa

(a) *C. t. tunjue* Vig. & Horsf. (B) J.

14. CERVUS UNICOLOR Kerr.

The Sambar

{ (a) *C. u. equinus* Univ. MP, S. & Nias I.
(b) *C. u. brookei* Hose B.

15. MUNTIAcus MUNTJAK Zimmerm.

The Barking Deer.

{ (a) *M. m. muntjak* Zimmerm. J.
(b) *M. m. moschatus* Blainv. S. Nias I.
(c) *M. m. montanus* R. & K. Mts. S.
(d) *M. m. bancanus* Lyon Banka I.
(e) *M. m. rubidus* Lyon B.
(f) *M. m. robinsoni* Lydek. Bintang I.
(g) *M. m. peninsulæ* Lydek.
Dinlings & MP

16. MUNTIAcus PLEIHARICUS (Kohlb.)

The Pleihari Barking Deer.

S. E. Borneo.

Fam. 7. Bovidae.

17. BOS GAURUS H. Smith

The Gaur.

(a) *B. g. hubbardi* Lydek. MP.

18. BOS BANTENG Raffles

The Banteng

{ (a) *B. b. banteng* Raffles J.
(b) *B. b. lawi* Lydek. B.
(c) *B. b. butleri* Lydek. (?) MP.

19. BOS BUBALIS Linn.

The Indian Buffalo.

(a) *B. b. hosei* Lydek. B.

20. CAPRICORNIS SUMATRENSIS Bechst.

The Serow or Mountain Goat.

{ (a) *C. s. sumatrensis* Bechst.
S. & South MP. (?) B.
(b) *C. s. sweetenhami* Butl.
MP. (Perak).

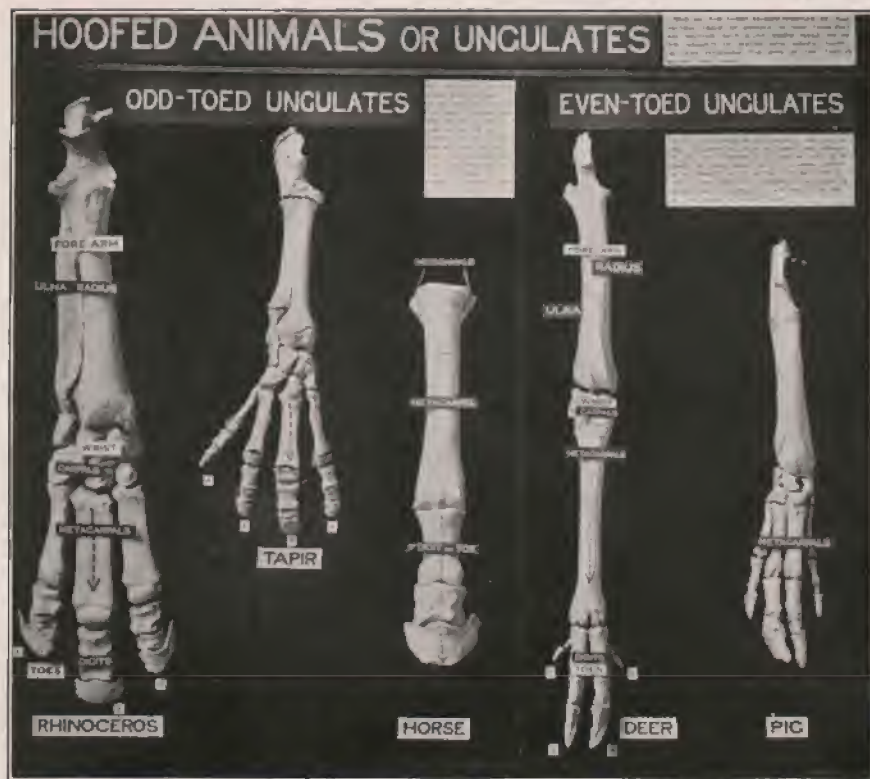
LITERATURE ON MALAYSIAN UNGULATES.

I have selected twenty books and articles likely to be of interest to anyone who wishes to pursue more thoroughly any of the subjects lightly touched upon in this Guide. Much of the information contained in this Guide has been derived from these works.

- Beddard** CAMBRIDGE NATURAL HISTORY: MAMMALIA, by *F. E. Beddard*, M.A., F.R.S. London, 1902.
- Gyldenstolpe** ON A COLLECTION OF MAMMALS MADE IN EASTERN AND CENTRAL BORNEO BY MR. CARL LUMHOLTZ, by *Nils Gyldenstolpe* in *Kungl. Svenska Vetenskapsakademiens Handlingar*. Band 60. No. 6. Stockholm, 1919.
- Hose** MAMMALS OF BORNEO, by *Charles Hose*, F.R.G.S., F.Z.S. London, 1893.
- Hubback** ELEPHANT AND SELADANG HUNTING IN THE FEDERATED MALAY STATES, by *T. R. Hubback*. London, 1905.
- Kloss** THE NEW SUMATRAN PIG, by *C. Boden Kloss*, F.Z.S., in *Journ. No. 45. Straits Branch, Royal Asiatic Society*. Singapore, 1905.
- Kloss** THE PRIMATES, CARNIVORES AND UNGULATES OF THE PENINSULAR REGION, by *C. Boden Kloss*, F.Z.S., in *Journ. No. 53. Straits Branch, Royal Asiatic Society*. Singapore, 1909.
- Kloss** MALAYSIAN BEARDED PIGS, by *C. Boden Kloss*, F.Z.S., in *Journ. No. 83. Straits Branch, Royal Asiatic Society*. Singapore, 1921.
- Lydekker** THE ROYAL NATURAL HISTORY. MAMMALS, by *Richard Lydekker*, B.A., F.R.S. London, 1894.
- Lydekker** GUIDE TO THE GREAT GAME ANIMALS (UNGULATA) IN THE DEPARTMENT OF ZOOLOGY. BRITISH MUSEUM NATURAL HISTORY, by *R. Lydekker*, London, 1907.
- Maxwell** IN MALAY FORESTS, by *George Maxwell*. London, 1907.
- Robinson & Kloss** RESULTS OF AN EXPEDITION TO KORINCHI PEAK SUMATRA. MAMMALS, by *H. C. Robinson and C. Boden Kloss* in *Journ. F.M.S., Museums, Vol. VIII. Pt. II. Kuala Lumpur*, 1918.

- Robinson & Moulton** THE BEARDED PIG (*SUS BARBATUS* MULL.) IN THE MALAY PENINSULA, by *H. C. Robinson and J. C. Moulton* in *Journ. No. 85. Straits Branch, Royal Asiatic Society.* Singapore, 1922.
- Schmeil** INTRODUCTION TO ZOOLOGY, by *Dr. Otto Schmeil.* London, 1901.
- Sclater** GEOGRAPHY OF MAMMALS, by *W. L. Sclater, M.A., F.Z.S., and P. L. Sclater, M.A., P.H.D., F.R.S.* London, 1899.
- Shelford** ON A FOSSIL TUSK FOUND AT BAW, UPPER SARAWAK, by *R. Shelford* in *Journ. No. 32. Straits Branch, Royal Asiatic Society.* Singapore, 1899.
- Shelford** A NATURALIST IN BORNEO, by *The late Robert W. C. Shelford, M.A., F.L.S., F.Z.S.* London, 1916.
- Skeat** FABLES AND FOLK-TALES FROM AN EASTERN FOREST, by *Walter Skeat M.A., M.B.A.S., F.A.I.* Cambridge, 1901.
- Trouessart** CATALOGUS MAMMALIUM, by *Dr. E. L. Trouessart.* Berlin, 1897-1904.
- Horn** MEASUREMENTS AND WEIGHTS OF THE GREAT GAME OF THE WORLD: BEING A RECORD FOR THE USE OF SPORTSMEN AND NATURALISTS, by *Rowland Ward, F.Z.S.* London, 1892.
- Winstedt** SOME MOUSE-DEER TALES, by *R. O. Winstedt* in *Journ. No. 45. Straits Branch, Royal Asiatic Society.* Singapore, 1905.





TYPES OF UNGULATE FEET
Exhibited in the Raffles Museum.



T. R. Hubback.

THE ASIATIC ELEPHANT

Shot by Mr. T. R. Hubback in the Malay Peninsula.



Light Studio

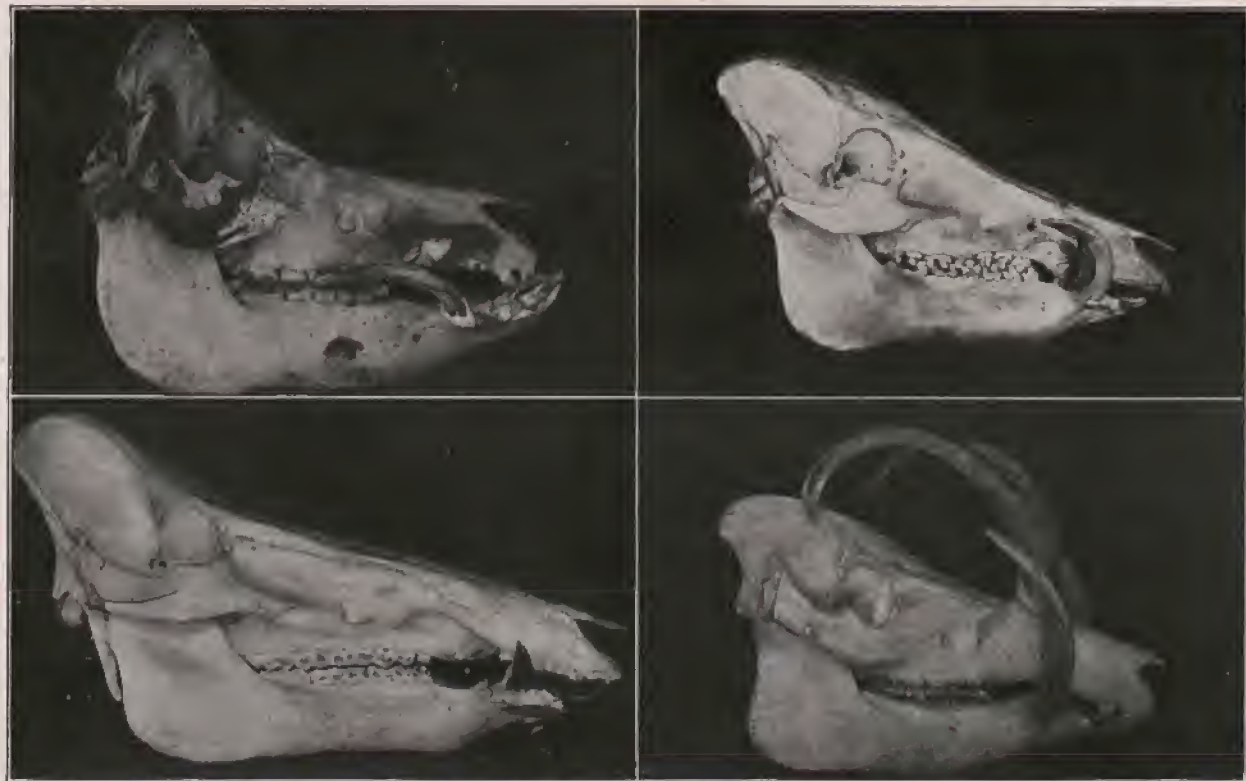
YOUNG MALAYAN TAPIR.



T. R. Hubback.

THE SUMATRAN RHINOCEROS

Shot by Mr. T. R. Hubback in the Malay Peninsula.



TYPES OF PIG SKULLS

Exhibited in the Raffles Museum.

V. Knight

The Domestic Pig
The Bearded Pig

The Wild Pig
The Babirusa



THE BEARDED PIG

Light Studio

From Rhio Archipelago; exhibited in the Raffles Museum.



Light Studio.

THE SMALLER MOUSE-DEER OR PLANDOK

Exhibited in the Raffles Museum.



Light Studio.

THE BARKING DEER
Exhibited in the Raffles Museum



T. R. Hubback.

THE GAUR OR SELADANG
Shot by Mr. T. R. Hubback Malay Peninsula.



THE WATER BUFFALO
In British North Borneo.